Preface

In early 1993, the U.S. Environmental Protection Agency's (EPA) Office of Wastewater Compliance and Enforcement suggested to the National Research Council's Water Science and Technology Board (WSTB) that it should consider undertaking a study of public health and public perception issues associated with the use of treated municipal wastewater and sludge in the production of crops for human consumption. At the time, EPA was just finalizing the Part 503 Sludge Rule, *Standards for the Use or Disposal of Sewage Sludge*, and one of the major implementation concerns was with the food processing industry's reluctance to accept the practice. When EPA first promulgated criteria for land application of municipal wastewater sludges to cropland in 1979, some food processors questioned the safety of selling food crops grown on sludge-amended soils and their liability. In response, the principal federal agencies involved—EPA, the U.S. Food and Drug Administration (FDA), and the U.S. Department of Agriculture (USDA)—developed a Joint Statement of Federal Policy in 1981 to assure that current high standards of food quality would not be compromised by the use of high quality sludges and proper management practices. Nevertheless, the food processing industry remains concerned about safety and market acceptability, and at least one company has adopted an official policy that bans the purchase of any crops grown on fields receiving municipal sewage sludge or treated municipal wastewater. With the issuance of the Part 503 Sludge Rule in 1993, public concerns with a number of technical, regulatory, and environmental issues have surfaced. Because cropland application of both sludge and wastewater represent important management options, municipal wastewater management officials have a vital interest in the feasibility of these practices.

Therefore, in mid-1993, WSTB formed a committee representing diverse expertise and perspectives to conduct an independent study of the safety and practicality of the use of these materials for the production of crops for human consumption. The study sought to review (1) the historical development, rationale, and scope of the practice of treating municipal wastewater and sludge in the United States; (2) wastewater treatment technologies and procedures for agricultural use of these materials; (3) effects on soils, crop production, and ground water; (4) public health concerns about microbiological agents and toxic chemicals; (5) existing regulations

and guidelines; and (6) economic, liability, and institutional issues. The committee based its re-view on existing published literature and discussions with experts in the field. The committee was not constituted to conduct an independent risk assessment of possible health effects, but instead to review the method and procedures used by EPA in its extensive risk assessment, which was the basis for the Part 503 Sludge Rule.

The committee met five times over a 17-month period including field visits to the Irvine Ranch Water District in California, the CONSERV II Water Reclamation Program of Orange County and Orlando, Florida, and the Disney World, Florida reuse programs. The committee also held a one-day workshop at Rutgers University in New Brunswick, New Jersey to hear from researchers, public interest groups, farm credit bureaus, farmers, and state and city planners on land application of municipal sludge in the Northeast.

The committee focused primarily on the issues surrounding the use of treated municipal wastewater effluents and treated sludge in food crop production, concentrating on the uptake of chemical constituents and pathogens by food crops. The study did not include an investigation of what happens after the crops are harvested (e.g., processing of food products). Further, the committee was not constituted to evaluate site-specific implementation of wastewater effluent and sludge reuse projects, or to compare the relative merits and risks of various other forms of disposal or beneficial uses. However, the committee recognized that in addition to the safety and practicality of using these materials on food crops, there are many implementation issues involved with the agricultural use of municipal wastewater and sludge including the degree to which the regulations are implemented and enforced, the public confidence in local reuse programs, local nuisance and traffic problems, environmental and product liability issues, and overall public perceptions. In several of these areas, this report notes particular findings that should receive the attention of federal, state, and local authorities responsible for implementing reuse projects.

It is hoped that this report will be particularly useful to food processors, states, and municipalities in assessing the use of treated municipal wastewater and sludge in producing crops for human consumption. It highlights public concerns and regulatory issues likely to be faced, and also identifies some additional areas for research.

The Committee on the Use of Treated Municipal Wastewater Effluents and Sludge in the Production of Crops for Human Consumption consisted of 14 members with experience in soil and crop science, agricultural engineering, wastewater and sludge treatment, soil microbiology, toxicology, ecology, infectious disease, public health, economics, law, and other relevant fields. The committee gained insights from a far larger group by inviting guests to its meetings, par-ticipating in field trips, and reviewing the literature. My great appreciation goes to the committee, each of whom gave significant time and energy to create this report. Additionally, I would like to thank Rufus Chaney and Richard Bord for providing their time and resources to the study. I want to thank the staff of the WSTB, especially Gary Krauss, study director, and Mary Beth Morris, project assistant. I would also like to thank the study sponsors: the EPA, the U.S. Bureau of Reclamation, the USDA, the FDA, the National Water Research Institute, the Water Environment Research Foundation, the National Food Processors Association, the Association of Metropolitan Sewerage Agencies, California's Eastern Municipal Water District,

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